

## Introduction

# Craftwork as Problem Solving

Trevor H.J. Marchand

In September 2013, I convened a two-day workshop at the *Making Futures* conference in Plymouth, England. This was the third in an ongoing series of stimulating biennial conferences on the subject of craft organised by the Plymouth College of Art, attracting makers and researchers from around the world. My workshop was titled *Craftwork as Problem Solving*, and the learning it generated forms the basis of the present book. In short, the aims of this collection are twofold: to document problem solving as it arises and evolves both in the processes of craftwork and in being and becoming a contemporary craftsperson; and to bring deeper theoretical understanding to the diversity and complexity of tactics and strategies that craftspeople employ in overcoming the challenges confronted in daily work. These aims ultimately form part of my longer-term objectives as an anthropologist to better grasp how craftspeople come to know what they know, and to promote greater public appreciation for the intelligence of skilled handwork.

Of the 12 Plymouth workshop presenters, six have contributed chapters, and a further seven authors were invited to participate in the publishing project. As a result, this book brings together the thinking of a cross-disciplinary group, consisting of designer-makers, artists, an architect, a filmmaker, and several anthropologists of craft. Notably, all of the contributors have had, or continue to have, an active hand in making, and thus reflections on personal experience inform many of the ideas explored. Though some of the disciplines represented are 'classic' craft occupations, such as glassblowing, potting, basket and fabric weaving, woodworking, furnituremaking, and architectural restoration, others, like printmaking and film editing, straddle a fine line between craft and art; while others still, such as bike mechanics or garment making, might be more readily classified as trades, and horse training might be regarded as a profession.<sup>1</sup> All of the contributors, however, conceive of their respective disciplines as a craft, or as having a strong craft ethos.

My project brief invited participants to examine the ways that problems are encountered, searched for, conceived of, and resolved in craft. Authors were

---

<sup>1</sup> The inclusion of horse training (or any kind of animal training) in the list of crafts may be contentious to some readers. Trainers, however, like those studied by Crowder (this volume), consider their work to be so. The skilled formation of sentient beings demands practice, as well as many of the qualities and characteristics listed in the previous section. Notably, Sennett includes discussion of parenting as a craft (2008: 101–2).

encouraged to do so either using ethnographic methods or by carefully scrutinising their own engagement in the processes of design and making. Intriguingly, more than half initially replied that they would have little to say about problem solving. Solving problems was perceived by them as either a mundane task routinely executed in the flow of work and therefore unworthy of special attention; or conversely as a distinct and occasional activity that was taken up outside regular craft practices, and thus requiring a specialised field of study, such as psychology or cognitive science. However, once they began dissecting their data or bringing greater awareness to their own practices, the role of problem solving was positively re-evaluated and recognised to be thoroughly integral to craftwork.

As I hope to make obvious in this introductory chapter, problem solving activities are involved at every stage of production. In the practical work of design and making, problem solving takes place when calculating quantities, weights, and dimensions; engineering structures; configuring geometries, proportion, and scale; choosing or producing colours; selecting and evaluating materials (including live animals); choosing, setting-up, and possibly modifying tools for the task; and making jigs.

While physically engaged in designing and making, the human body has its own challenges to overcome. At a motor level, the craftsperson must resolve how to take-up good postures, form correct grasps, coordinate bi-manual practices, and perform fluid and economic movements. They must also resolve how to continue working when confronted with limitations or failure of their body caused by injury, illness, or ageing (Marchand, 2014b).

Problem solving is also part and parcel of producing within set budgets and timescales; interpreting client needs and aspirations and translating those interpretations into materials and objects; accommodating, or critically engaging with, changing tastes, styles, and market forces; and projecting how the crafted object (or trained animal) will be accommodated within, or be suited to, its new destination (Marchand, 2015). Solutions are needed, too, when grappling with green agendas, issues of environmental sustainability, changing technologies, or the introduction of new materials. At social and economic levels, problems arise in terms of gaining access to apprenticeships or to basic or advanced forms of training; getting access to tools, supplies, and suitable workspace; and establishing a community of fellow practitioners, or fitting into an existing one.

In sum, craftwork provides an ideal setting for witnessing the emergence of a vast diversity of challenges and, more importantly, for observing our human creative potential for overcoming them. Problem solving, I argue, is at the heart of learning and knowing. Therefore the 'arts of problem solving' merit dedicated scholarly attention and ethnographically-based research in order to bring about better understanding of situated cognition and practice. That, in brief, is the aim of this book.

My introductory chapter first explores the category of craft as it has come to be defined, in large part in contrast to fine art as well as in its positive relation to a nebulous set of qualities and characteristics. After settling on the idea that craft is

a polythetic category with the inherent capacity and flexibility to shed and absorb new ‘defining’ criteria, the discussion moves next to problem solving, identified as a core activity in craftwork. Making mistakes is acknowledged as a productive starting point for learning. The definition of ‘problem’ and the nature of problem solving are then more fully investigated within a framework of situated practice and cognition, and illustrated with craft examples. The chapter closes with an outline of the remaining book.

### **Craft: A Polythetic Category**

The definition of the English word ‘craft’ and what belongs to that category is not absolutely fixed.<sup>2</sup> As curator Paul Greenhalgh has observed, ‘craft has always been a supremely messy word’ (2002: 1). In the most general sense, a craft refers to a professional kind of work or trade or a pastime activity, any of which centrally involves specialised skills. Such skills are popularly associated with the work of the hand and conceived as being carried out on particular (often natural) materials with a kit of dedicated tools. As a transitive verb, ‘to craft something’ implies making in a skilful manner: a well-crafted chair, inlaid box, or embroidered wall-hanging, for example.

The terms craft, crafting, and crafted are also commonly employed to describe or praise ideas well-conceived, activities well-executed, or things well-made: the craft of writing, crafting opinions, a well-crafted beer. But such products – material or immaterial – are not properly ‘crafts’ according to conventional understanding of the word. Marketing campaigns for myriad commodities, from luxury to everyday goods, have usurped the concept of craft in order to ‘weave’ histories and narratives around mass-produced items, to suggest hands-on attention to detail, and to lend products an air of bespoke exclusivity. While such usages of craft, crafting, and crafted further blur the definitional boundaries of ‘craft’ as a category, they arguably cultivate popular aspiration for possessing and consuming things made with skill and attention and they rouse longing for an alternative, idealised way of living and working – one that is ethical, guided by high standards of quality, and characterised by direct, unmediated connections between mind, body, materials, and the environment.

Craft can also be used in adjectival and adverbial forms: crafty and craftily, respectively. These terms imply that the subject or their actions are tinged by cunning and deceit, as for example in the witch’s craft. Although craft’s links to the occult are not the concern of this volume, the association nevertheless implies that, in some contexts, skilled work is regarded as a kind of secret knowledge. This is the case, for example, among blacksmiths, weavers, or mud-brick masons in parts of West Africa (see McNaughton, 1993; Dilley, 2009; Marchand, 2009 respectively),

<sup>2</sup> The contemporary English term ‘craft’ derives from the Old English *craft* meaning power or physical strength, coming from the German word *kraft* with similar meaning.

and among some elite European potters and ceramicists who jealously guard the chemical formulas for their glazes, weavers their dyes, or smiths the composition of their metals. But, arguably, a large part of the reason that secrecy, mystery,<sup>3</sup> and ambiguity continue to cling to craftwork is that the associated skills and know-how of many crafts can only be fully ‘grasped’ in the doing and with long practice, and therefore elude the understanding of the average non-artisan layperson.

Since the Renaissance, craft in Western Europe was divided from art, and defined in contrasting and lowly relation to it. This legacy certainly has its roots in the ancient Greek partition between intellectual and manual labour. For the Greeks, intellectual work was associated with the esteemed disciplines of mathematics, geometry, and logic (Sohn-Rethell, 1978). *Techne*, on the other hand, referred to art, craft, and craftsmanship, all of which were consigned to the province of manual labour. The mathematical formulation of perspective in drawing and painting during the early fifteenth century, however, licensed elite artists to leverage the ancient Greek distinction in order to separate themselves as authors of visual representations and symbolic statements from the makers of things. The Renaissance artist, draughtsman, and engineer (e.g. Leonardo da Vinci as the quintessential ‘Renaissance Man’) created intellectual works on paper that could be assigned to the craftsman for manual execution. As anthropologist Kathy M’Closkey noted,

Drawing became the hallmark of “artistic literacy”, but it also provided the means to dictate to others what would be produced. The concept of the artist as a unique, outstanding individual developed in contrast to the view that the anonymous craftworker, using only technical ability, executed the specified designs of either a patron or an artist (1996: 115).

The meaning of craft, and its status, has fluctuated over the centuries in relation to the ‘fine arts’, and in relation to changing social politics, economics, and public attitudes toward education and vocational training. During the second half of the nineteenth century, William Morris, inspired by passages from John Ruskin’s *The Nature of Gothic*, liberated craftwork from its restrictive Victorian associations with the working classes and made craft and craftwork fashionable and, notably, a vehicle for social change (1996, 2004). According to Arts and Crafts theory, craft objects were assumed capable of satisfying ‘the same expectations brought to a painting or a sculpture’. But alas, notes contemporary metalsmith Bruce Metcalf, ‘such open-mindedness was short-lived’ (2002: 16). Remarking on the persistence of craft’s ‘not quite art’ status, material culture researcher Kate McIntyre provocatively labelled craft ‘the second sex’: ‘marginalised, trivialised, feminised, it is undermined by connotations of domesticity’ (in Jackson, 2004). In large measure, craft continues to be conceived as a workmanship of physical

<sup>3</sup> The mysteries (or misteries), in archaic usage in mediaeval England, referred to the handicraft trades.

labour in concert with 'earthy' materials, producing primarily decorative wares for middleclass homes. It is therefore made to stand in opposition to the intellectual endeavour of 'the artist' who strives to 'overcome the material's resistance' in order to transform it into a transcendental visual sign (Risatti, 2007: 137).

If craft has been associated through much of history with the body, the female, and the domestic sphere, then structuralist reasoning would imply that it has also been conceptually positioned more closely to nature than culture. Ostensibly, the main remit of craft is to supply basic, concrete artefacts for survival or for making life and our surroundings more comfortable, and not to generate abstract symbols to think with or found institutions for empowerment. Without the dictates of an architect's blueprint, masons erect only 'vernacular dwelling'; carpenters specialise in making life's necessities, from cradle to coffin; blacksmiths forge agricultural implements and basic tools; leatherworkers produce the tack for work animals; potters and glassblowers make vessels for holding, eating and drinking; basketmakers make receptacles for containing and carrying; weavers produce the cloth that clothes us, etcetera.

These crude (mis)conceptions about the limits, purpose, and the 'nature' of craft have also been tactically construed to make craftwork, and handwork more generally, the engine of grassroots countercultural movements. The underlying socialist ethos of the Arts and Crafts movement, for example, was a critique of Western Europe's hegemonic capitalist culture that arose, and was sustained by, industrialisation, mass production, and the mechanisation of human labour. In effect, however, the industrial age and its dominant mode of production made possible the emergence of modern craft as both practice and social ideology. A half century later, the crafts revival of the late 1960s and 1970s was fuelled by anti-establishment sentiment, a middleclass quest for rural self-sufficiency that was independent of 'the system', and an almost paranoid fear of encroaching technology that supposedly threatened human autonomy, creativity, and purpose (Harrod, 1999: 242).

Bruce Metcalf has observed that craft today remains a social movement of resistance and opposition to mainstream culture. It stands against the anonymity of mass production; against ugliness; against big-money capitalism; against corporate labour; and against disembodiment in all its forms (2002: 16). Guerrilla knitting (also known as yarn bombing or graffiti knitting) epitomises this objective by reclaiming abject public spaces and making 'place' by covering surfaces or wrapping objects in brightly-patterned knitwear. Stemming from an intellectual line that runs through Ruskin, Morris, and American pragmatist and educator John Dewey, Richard Sennett's deliberations on craft (2008) are equally infused with philosophical and socio-political intent. Making material things well – with skill, commitment, and judgement – provides an experientially-grounded model for the making of good human relationships and for the making of a future grounded in good citizenship (ibid.: 289–91). 'Craftsmanship', Sennett begins his book, 'names an enduring, basic human impulse, the desire to do a job well for its own sake' (ibid.: 9).

Glenn Adamson's *Thinking Through Craft* does not share that agenda for social transformation. But, like Sennett, the art historian conceives of craft as 'a process', and proposes that it 'only exists in motion'. According to Adamson, craft is 'a way of doing things, not a classification of objects, institutions, or people'. It is not a fixed category, but rather craft is understood to be an 'active, relational concept', embodied most powerfully in skill (2007: 3–4). By contrast, his contemporary, Howard Risatti, has defined craft as being inclusive of a wider, perhaps more traditional constellation of features that comprises mastery of specific techniques and materials, as well as the form and the 'practical physical functionality' of the objects created (2007: 16–18). The nature of the objects produced is indispensable to the identity of craft, according to Risatti, and there is need to recognise the quality of 'practical physical function' as the 'normative ground upon which craft originated' (ibid.: 20; see also Metcalf, 2002: 21). He argues that even so-called 'critical objects of craft' are *about* function in light of their purposely not functioning or subverting functionality altogether (e.g. chairs that cannot be comfortably sat upon, jugs not made for pouring, oversized jewellery that cannot be worn). They produce critical dialogue within the field of craft, not outside it, because ultimately 'they share in the primary conditions of traditional craft as an artistic enterprise of formalization and materialization around function' (2007: 284–6).

Whether craft objects are functional or not, all craft objects are arguably superfluous in today's world, and many can be classed as luxury goods. There are innumerable differences in the experience of being a craftspeople that emerge with differences in gender, economic and social-class position, or ethnicity. But a shared feature that transcends the differences and unites contemporary craft experience, whether in Europe, Asia, Africa, or elsewhere, is that contemporary craftspeople are operating in a surplus economy where mass production has rendered their production redundant and inessential – or threatens to do so. Both the subjectivities of craftspeople and the material objects they make are produced in the interstices between global capitalism, changing technologies, and an incessant search for 'authenticity'.

By way of example, earthen architecture traditions across the West African Sahel are being supplanted by homogenous, rectilinear concrete breezeblock and corrugated tin-roof constructions. The annual maintenance required for mud-brick structures is time consuming and costly; inhabitants complain of unsanitary conditions and lack of amenities; and the old ways of building are judged to be anachronistic and antagonistic to aspirations for modernity. In the Malian town of Djenné, historians, conservationists, and influential stakeholders in the heritage industry responded to the perceived threat to mud-brick architecture by establishing a new training school for the 'formation' of masons. The objectives of the school (opened in 2009) were to improve literacy and numeracy rates among masons in order that they might engage more fluidly with clients, suppliers, and their building team members, and operate more effectively in a changing culture and economy where paperwork, formal bids, legal contracts, and accurately drawn plans have become increasingly the norm. In tandem with the classroom training,



the founders also envisioned an ‘on-site school’ where masons would learn to manufacture and use the old-style cylindrical *djenné-ferey* brick; to produce more durable, weather-resistant mud plasters, and to make buildings that accommodate modern conveniences and respond to contemporary lifestyles without sacrificing traditional aesthetics, materials, and construction methods (Marchand, 2014a: 164). In effect, control over the reproduction of Djenné’s architectural tradition has been progressively wrested from the hands of the craftsmen (and their clients) by elite players.

The circumstances in Djenné beckon comparison with the Rethemniot artisans studied by anthropologist Michael Herzfeld who ‘no longer control the criteria for the taste of “tradition” that they supposedly embody, produce and represent’. Rather, the personal experiences of these Greek craftsmen are ‘embedded in a set of hierarchically ordered, concentric and interlocking *disabilities* ... [that] extend far beyond the ramifications of class, and many of them originate in the political relations among nation states’ (2004: 207). In Djenné, the mud-brick architecture that has contributed very considerably to the distinctive character of the town has been recast as ‘world heritage’. This process began with the French colonial exhibitions that included ‘Sudanese-style’ pavilions, and was continued under the aegis of post-colonial Malian governments leading ultimately to Djenné’s inclusion on UNESCO’s roster of World Heritage Sites in 1988. As a result, the craft practices and expertise of Djenné’s masons have been harnessed to national and international concerns to reproduce a static version of tradition: one that is appealing to global tourism and that attracts foreign aid and development initiatives.

By contrast, the British fine woodworkers whom I trained with and interviewed retained far greater agency over their self-representation. The UK’s persistent self-promotion as a world leader of cutting-edge art and design has enabled some British furniture makers to cultivate identities as ‘designer-makers’ and to strategise positions closer to the centre of a global order that imputes hierarchies of value in the world of craft. Artist and curator Ingrid Bachman has noted that Western collectors tend to ‘fetishize the product of excessive and often skilled labour from an individual in the developed world, but disregard similar labour originating from the developing world’ (2002: 46). The maker in the developing world, according to Bachman, is ‘visible only through its label – made in China, made in the Philippines’ (ibid.). Her observation is, for the most part, correct. However, the lubrication of global cash flows and an expanding transnational market of collectors over the past three decades have made possible the emergence of individual artists as well as craftspeople from Africa, Asia, and South America, whose names are gaining currency equal to that of their Western counterparts. Names, like objects, are marketable, collectable, and promise return on investment.

This last point takes us back to the uneasy relation between craft and art. The vulnerability of the distinction between them intensifies when the valuing of craft shifts from functionality as the chief criterion (e.g. the Scottish fisherman’s creels studied by Stephanie Bunn, this volume) to criteria of authorship, authenticity, and speculative investment (e.g. the wooden vessels made by Malcolm Martin,

this volume). Furthermore, a current paradigm in British craft promotes ideas of post-disciplinarity, post-function, and post-materials in craftwork, and revolves around the international patronage of museums, galleries, and collectors. This broadens the gap with the 'traditions' – imagined or real – which have for so long underpinned craft: namely emphasis on the handmade, mastery of a particular set of tools and palette of materials, and the longed-for intimacy that binds maker to their materials, locality, and the clients they serve.

What is hopefully clear by this point is that craft is a polysemous, ambiguous, and often-contested term. In the discussion so far, craft has been variously described as skilled handwork; as a kind of secret knowledge; as being inextricably entangled with mastery of materials, tools, and techniques; as a residual category of art; as social resistance against modernity and its processes of alienation; as an exemplar for, and vehicle toward, good and ethical conduct; as process, and in motion; as directly related to the functional objects that it yields; and, throughout the contents of this book, as problem solving. In the introduction to her scholarly tome on the crafts in Britain, Tanya Harrod states plainly that she does not aim to define them, and that 'the process of defining is part of the history of the twentieth-century crafts movement and continues to be so' (1999: 9). In proffering definitions or taking up positions in the debates, both academics and practitioners of craft underscore certain features as core, relegate others to the peripheries, or exclude them altogether. But in fact, each feature forms part of the total, ever-shifting discourse on craft. Therefore, rather than attempting to constrict craft within yet another working definition, I propose instead that craft be acknowledged as a polythetic category.

A polythetic category is one in which any of its members possess some, but not necessarily all, the properties attributed to that category. Although no single property is essential for membership, popular belief maintains that the category is stable, and is so across time and space. The concept of polythetic category has been borrowed by anthropologists to describe, for example, 'ethnicity' (see Fardon, 1990; Wilson, 1993). Claims to ethnicity may be grounded in a combination of any of the following: shared religion, language or dialect, myths of origins, ties to an ancestral homeland, descent, social organisation, cultural beliefs, ritual practices, etiquette, skin colour, physical features, ways of dress or adornment, and artistic traditions and craft practices. Within an ethnic community, there may be internal disagreement over which attributes, practices, and beliefs are or are not included; and qualifications may change over time in response to changes in the wider social, political, religious, or economic system(s) in which the identity operates. Not surprisingly, the flexible nature of the category presents a conundrum for the social scientist wishing to make an empirical comparative analysis of ethnicity between different groups, or across time (see Needham, 1975). For that reason, the category is more productively studied as it is played out as a vehicle of identity construction in the context of everyday social and political life.

The category of craft is not dissimilar. Greenhalgh has accurately noted that the crafts



have no intrinsic cohesion; they have no *a priori* relationship that makes them a permanently peculiar or special gathering; there could be fewer or more of them; they are together now ... because the complex forces that brought them together, despite shifts in circumstances, hold them in proximity. This proximity is not stable and is certainly in a process of change. Nevertheless they are a consortium still. (2002: 1)

In accepting that the category is open-ended, multi-stranded, and polythetic in nature, we can also accept that a search for a fixed set of defining features, universally shared, is futile. Based on my own apprentice-style studies as an anthropologist among craftspeople, and the studies presented by the contributing authors to this book, I conclude this discussion with an alphabetic inventory of things, properties, and characteristics regularly attributed to the meaning of craft, craftwork, and craftspeople.

*Apprenticeship* – historically regulated by guilds, liveries, or other forms of professional association, but superseded in a growing number of places worldwide by college or state-led training programmes;

*Attitude* – qualified by commitment, patience, fastidiousness, and perseverance for perfection;

*Autonomy* – expressed as command over one's production, from start to finish;

*Bespoke* – meaning the tailor-made production of things;

(The) *Body* – in motion, often with emphasis on highly-controlled gestures, articulated grasps, and dexterity of hands and fingers;

*Design and Making* – as iterative, often overlapping, mutually-informing processes;

*Economic Precarity* – as a result of vulnerability to fluctuating (or diminishing) market demand for handmade objects;

*Expertise* – in a discipline and its related practices;

*Focus* – as a skilled ability to direct awareness and bring concentration to the task;

*Functionality* – of handcrafted items that have a practical use value;

*Identity* – of people who actively label themselves (and others) 'craftsmen' or 'craftswomen', and claim that what they do is craftwork, and what they produce is craft;

*Innovation* – as the outcome of deliberate or improvised experimentation with tools, techniques, and materials;

*Locality* – that stems from the association of particular places with certain kinds of materials, distinct aesthetic traditions, and vernacular ways of making;

*Materials* (often natural) – that have become strongly correlated with specific craft disciplines;

*Problem Solving* – in response to challenges arising at all stages of craftwork;

- Social Politics* – that accompany the pursuit of alternative ways of working and living, typically in opposition or resistance to alienating technologies, neoliberalism, globalisation, and consumer capitalism;
- Risk* – as something inherent to work done by hand (see Pye, 1995);
- (The) *Senses* – including refined senses of vision, audition, olfaction, touch, taste, kinaesthesia, or proprioception as required for the task;
- Skill* – in the form of skilled attention, discernment, and movement that are acquired through extended training and practice;
- Standards* – for quality design and production;
- Tools* – designed for specific activities, and some of which become the hallmark of certain craft disciplines;
- Tradition* – that connects practitioners, practices, and things produced to a past (real or imagined), and thereby constructs a sense of continuity. Claims to tradition also place craft in tension with modernity's dominant modes of production.

In sum, the attributes that members of a craft community select in defining themselves and what they do and make will draw upon all or any combination of the above, emphasising some things, properties, and characteristics, and disregarding others. Yet further attributes may be included and the polythetic nature of craft licenses this. The list is by no means exhaustive, and its contents are liable to future expansion (or contraction) in response to changing technologies for making (see for example Peter Durgerian and Jenn Law, this volume), introductions of new materials, and changing political landscapes, economies, and regimes of consumer taste at both local and global levels. All such changes throw up fresh challenges to overcome, new kinds of mistakes to be made and repaired, and novel sorts of problems to solve. Craft meaning, identity, and knowledge are in a state of constant evolution.

It is to a discussion of mistakes, challenges, and problem solving in craft that I turn next.

### **Mistakes: The Starting Point for Learning**

'I can't teach anybody unless I've got plan A that I'm really happy with; plan B if need be. And, plan C ... if it all gets to the stage that it's unsalvageable', began Cheryl's induction for the new fine-woodwork trainees. 'But I know the difference', she continued, with a reassuring smile. 'And so I need to be able to teach you what to look out for, and when; when the worst of the problems are likely to occur, and why. If I can do those things, then I can help you to avoid making the mistakes, while understanding why they've occurred'.

Cheryl took up carpentry when she was in her late twenties, training first on a short course in Lambeth and followed by a three-year apprenticeship in maintenance carpentry at the Southwark Women's Workshop. 'At a certain point in time, in the

1980s, there were small pockets of women working in the trade as apprentices on all the left-wing councils' in London, Cheryl told me in an earlier interview. Her first teaching experience in carpentry was at the Lewisham Women's Workspace. She joined the staff at the Building Crafts College in Stratford, East London, in 2003. For eight years, she instructed young joinery apprentices who were sent to the College on block release from the construction industry, and in 2011, she was appointed first-year convenor of the two-year programme in fine woodwork.

From her long teaching experience, Cheryl recognised that trainees are 'going to panic if they make a mistake – especially the ones that really care'. Her method was 'to show them that there are general ways of getting around it. There are going to be consequences; and they'll have to make decisions. But, that's when they're learning'. Standing, now, before 16 attentive men and women of mixed ages, Cheryl continued her introductory talk:

You're not going to go through a flawless year of making no mistakes. You're not going to learn anything if you do. So, as devastating as it is sometimes to make a mistake, there are ways to fix it. If it ever gets to the stage where, maybe I haven't kept too much of an eye out for you, and you've got quite far into the project and discover a mistake that you'd made much earlier, I will show you a fast way to get back to where you were, at the point where you made the mistake. And you will have learned huge amounts by then. It also gives you a second chance to do things and to put other stuff right, and to make it much better than it was in the first try. So, you know, don't get too upset by mistakes. This is college; this is where you can make mistakes. It costs nothing.

Making mistakes is par for the course when embarking on any new endeavour. Learning does not usually arise while actually making the mistakes, but rather, as Cheryl implied, the making of mistakes offers critical starting points for learning and improving. Learning arises *in* spotting that a mistake has been made, identifying and understanding it as a problem for which a strategy can be devised or a tactic executed to remove, resolve or work around it, and, hopefully, to move on with the knowledge that the experience has afforded. These procedures do not necessarily unfold in that neat linear manner, or as discrete events. The physical activity of putting something right, for instance, might simultaneously incite a reconceptualisation of the nature of the mistake; or, discouragingly, it might even lead to identifying further mistakes, or an altogether different mistake from that initially isolated as the problem source. In some instances, arrival at a correct understanding of the nature of the mistake or problem might occur only *after* it is resolved (Kirsh, 2008: 268).

My point is that learning and discovery are not confined to abstract thinking *about* the problem, one step removed from the physical activities of implementing a solution. Instead, learning in craftwork (or in any other endeavour) demands situated perceptual experience and physical activity, as well as emotional engagement. Each of us can recall the feelings of frustration, excited anticipation,

calm exploration, and jubilant satisfaction (or possibly abandonment) that we experienced when confronted by a challenging problem and while working our way through it. The way that we feel colours our engagement in the task; and, likewise, the effectiveness of our trialled actions, the context in which we undertake them, and the nature of the task itself instantiate emotional response. Perceiving, doing, and feeling are part and parcel of the same cognitive matrix for problem solving that also includes producing inner or interactive dialogue and narrative around findings, procedures, experimentation, and results; numerical forms of interpreting, predicting, and calculating; and imagining.

Notably, the act of imagining in craftwork is not restricted to conceptualising intended objects or planned activities in the 'mind's eye' (i.e. visualising), but instead extends to imagining possibilities with all the perceptual senses that can be summoned in imagination, and as appropriate to the properties and qualities of the thing being designed and made. A craftsperson, for example, may imagine within the domain of motor cognition, or at a haptic level: imagining how an object will relate to the body; how it will feel or be held, carried, used, or interacted with; and how the thing might possibly be moved through, sat upon, or worn. Each of the above ways of knowing supplies stimulus and context to the others, constituting an abundant, overlapping exchange of information in the search for problems and their solutions (c.f. Marchand, 2010).

The chapters of this volume engage with the multiple and interconnected ways of knowing expressed through craftwork. Notably, the authors enrich the matrix of knowledge with the social and cultural dimensions of situated problem solving. Seeking, identifying, and overcoming mistakes, problems, and challenges are activities deeply informed by the cultural contexts in which craftspeople operate, and by the social networks in which they act. The majority of research and writing on human problem solving has been carried out in the fields of psychology and the cognitive sciences. The emphasis in much of that work has been on understanding, defining, and explaining the operations that occur in the so-called 'problem space', manifested as an internal mental representation where possible solution paths are constructed, evaluated, and selected *prior to action* (c.f. Newell and Simon, 1972). This volume counters the classical emphasis on internal 'mind' operations and it challenges the separation drawn between the mental arithmetic and the physical doing, by making the sensing, feeling, acting, and socialised body the locus of its enquiry. The craftspeople in all of the case studies presented are thinking *with* tools (Marchand, 2012), and actively engaged *with* materials, other actors, and the surrounding environment in their individual pursuits to settle problems, enhance skills, broaden knowledge, and construct social identities and professional status.

The explorations and discoveries made throughout this book contribute significantly not only to our awareness of problem solving in craft or skilled handwork, but to an understanding of human problem solving more generally. It is popularly conceived that the kind of problem solving undertaken by mathematicians, philosophers, and others engaged primarily in 'mental' labour is

substantially different from that of those whose work is more evidently hands-on. The former encounter problems and conjure solutions in the abstract realms of the imagination and the 'mind's eye', using logic, formulas, equations, theory, and hypothetical arguments; while the latter operate in the practical and the tangible, employing experimentation and trialling and testing solutions in empirically observable ways. However, as the chapters reveal, the stark demarcation between the two kinds of enterprise is in fact much less tidy.

Calculation, theorising, setting goals, imagining outcomes, and working out hypothetical pathways toward a solution are very much a part of both design and making in craftwork. But, equally, mathematicians, physicists, and philosophers engage bodily with the world in solving the problems that they encounter or set for themselves. Discussions and exchanges with colleagues serve to frame problems and to test and 'craft' ideas. They use pen and paper, chalk and blackboard, or keyboard and computer screen to objectify their thoughts in the medium of language or numbers, and to progress, refine, and shape them (Suchman and Trigg, 1993; Greeno et al, 1998). Academics might theorise space and time, the nature of things at vastly disparate scales (from universe to quark), or what it is 'to be'; but, ultimately, such intellectual explorations set out from, and return to, their author's sensory experiences in the world.

In returning to Cheryl's observation that discovering a mistake or identifying a challenge offers a starting point for learning, it then follows that the process of learning through exploration, experimentation, and reflection brings about new knowledge or a new way of knowing (or getting to know) something. New knowledge might pertain to the situations, circumstances, and contexts that give rise to certain kinds of problems; to the affordances and resources that the context makes available, or that it lacks; to one's methods for exploring and experimenting in a more efficient or effective manner; to one's routine for 'thoughtfully' engaging with a given kind of problem; to one's becoming aware, or honing existing awareness, of salient qualities, quantities, or things in the environment; or to one's technical procedures or physical practices that are implemented to avoid or make good a problem – or to any combination of the aforementioned. An individual's knowledge gained during problem solving therefore includes new understanding as well as newly-configured activity. In other words, learning happens not only at the 'conceptual' level, but our perceptual systems, too, 'learn' to attune differently to the environment and our nervous system and the muscles it coordinates 'learn' to carry out procedures in novel ways. Thus situated problem solving encompasses the full learning potential of a perceiving, discerning, and engaged individual.

If problems are prime catalysts to the growth of individual and shared kinds of knowledge (and consequently to our evolution as a species), then what we mean by a 'problem' merits further consideration.

## Problems and Problem Solving

What is a ‘problem’? Is there a set of defining traits that are universally shared by all problems? Is a problem a thing, or a state of things (material or social), that exists by virtue of itself? Or, are problems context dependent? Are they identified and defined relationally to goals and ideals, to expectations of form or function, to causes and effects, or to other exemplars? Are problems passively discovered or actively sought; or, in some cases, does their existence emerge through the coordinated interactions and negotiations between social actors? The aim of this section is to lay the groundwork for thinking about the diversity of problems and the varied approaches to solving them that are presented in this book.

Cognitive scientist David Kirsh has noted that problems are not a distinct category, and there is no natural kind called ‘problem’ (2008: 264–5). Problems, like their solutions, are tied to concrete settings. They vary in scope and nature from one field of practice to the next, and often from activity to activity within a single field. Problems are also tied to persons. They are big or small, complex or straightforward, stressful or exciting depending on the owner’s relationship to their problem.

According to the Oxford English Dictionary, the word ‘problem’ has several closely related meanings. The first two define a problem as ‘a doubtful or difficult matter requiring a solution’ and ‘something hard to understand or accomplish or deal with’. Problems may therefore be construed as challenges that call for response – challenges of the kind commonly encountered in craftwork. In craftwork, challenge arises at the point when a mistake or deficiency is identified and the craftsperson entertains the intention to resolve or improve it. Challenge also regularly arises when a craftsperson takes the initiative to expand their skill set by introducing techniques, practices, tools, or materials to their repertoire. And, for those who have mastered the elementary principles and practices of their trade, further challenge comes with setting personal or collaborative goals to innovate within, or expand upon, the existing inventory of designs or methods.

With specific reference to mathematics and physics, or presumably to any science, the OED defines a problem as ‘an inquiry starting from given conditions to investigate or demonstrate a fact, result or law’. This definition, however, also bears direct relation to craftwork. As Pamela Smith has established, craftwork and artisan production in the early Renaissance formed the basis of modern European scientific inquiry (2006). In contemporary craft, too, the creative processes of designing and making things involves a scientific attitude. Chairmakers, for example, must consider the tension, compression, torque, torsion, and sheer that loads will exert on the legs, seat, arms, and backs of the chairs they design; potters experiment with the chemistry of glazes to establish correlations between kiln temperature, timing, and resulting colours, effects, and the resilience of surfaces; glassblowers experiment with heat, materials, and methods to produce new vessels with novel affordances; watchmakers and mechanics must comprehend the physics of movement and the performance and durability of materials from



which components are manufactured; smiths need to understand the properties of metals; specialist breeders and trainers test the psychology, traits, potentials, and limitations of their animals and themselves; the work of weavers embodies mathematical, geometrical, and proportional understanding and experimentation (as observed by ethnomathematician Paulus Gerdes, 2010); and craftspeople specialised in the field of building conservation investigate the existing conditions and compositions of materials in a systematic way before making interventions that function, are sustainable, and are sensitive to the historic context. These are only a few examples of the ways that craftspeople engage ‘scientifically’ in their everyday work and problem solving. Growth and innovation in any of these creative fields begins with a grasp of the circumstances and the formulation of a corresponding problem that will drive the search for results – results that not only satisfy basic criteria, but also improve quality or push boundaries in terms of method, materials, aesthetics, form, or function.

To summarise, problems, like their solutions, are emergent and context dependent. In craft, problems emerge in tandem with identifying mistakes or registering deficiencies, and they arise while learning technique, and alongside experimentation, improvisation, and innovation. These activities are part and parcel of craftwork, and so too are the problems and challenges that accompany them. Problems, therefore, are not exceptional events. They crop up persistently, and at different scales of magnitude, with different effects and consequences; and they demand different resources and economies of effort to rectify, solve, or satisfy them. Additionally, ‘discovering’ problems, like solving them, may involve a joint effort. Although many practitioners are sole traders or independent makers, mistakes or deficiencies in their work are sometimes detected and pointed out by mentors and peers within the craft community; or, less desirably, by clients. Flaws may become glaringly apparent to the maker while in the company of a third party who is appraising his or her work. The scrutinising ‘eye’ of another can have the effect of forcing makers to take a step back and to thereby apprehend their creations with a heightened sense of critical awareness.

In the context of the workshop or studio, instructors and masters have a pedagogical duty to draw trainees’ attention to extant, latent, or prospective problems, and to progressively get trainees to conduct such searches and assessments on their own accord. An instructor might offer (or insist upon) their own tried-and-tested solutions; but the learning curve is steepest when trainees are given some latitude to explore technical and tooling processes and to discover solutions that work and ‘feel right’ for them. However, unless the scope for exploration has defined boundaries, a student’s zeal for learning can easily collapse into feelings of discouragement and frustration. Experienced instructors therefore limit the scale of challenge to a level that lies at the periphery of a student’s problem-solving ability – or, to use Vygotsky’s terminology, in their ‘zone of proximal development’ (1978). This enables students to reach beyond what they can already do independently while keeping safely within the bounds of what they can potentially achieve with some measure of ‘scaffolding’ in the form of assistance, guidance, or hints from

the instructor (or from a more-advanced fellow trainee). At the early stages of learning, the freedom to explore and experiment while being safely held in the mentoring process nurtures the growth of a 'personal style' in making, as well as in the ways that mistakes are sought, problems identified, and solutions discovered.

Seminal to that growth is acquiring a 'critical eye'. In the context of craftwork, having a critical eye is not – as the idiom seemingly implies – restricted to acute visual judgement. It includes more generally all of the perceptual senses used for assessing the quality of both one's own workmanship and one's practice, and spotting the deficiencies. A refined olfactory sense is crucial, for example, for the perfumer, the brewer, or the tanner; discriminating acoustic judgement is indispensable for the instrument maker, sound mixer, or maker of fine crystal stemware; and a discerning sense of touch is essential for the woodworker, the carver, the potter, and numerous other craftspeople whose outputs are valued for their surfaces, textures, thicknesses, or weights. In order to critically engage with one's own physical performance as a maker, one needs to hone an astute sense of one's bodily location and positioning in space (i.e. proprioception), of one's actions, movement, and gestures (i.e. kinaesthesia), of rhythm and timing, and of applied force and pressure. Emphases on developing particular senses, or a coordinated grouping of senses, vary depending on the craft or in relation to the task. But in every case, developing a critical eye means gradually elevating perceptual awareness through practice and learning to direct sustained attention to the kinds of information that needs to be registered, attended to, and processed in order to do something well. It involves active and regular seeking of irregularities, mistakes, deficiencies, and inefficiencies with the aim of learning, improving, and mastering – and, for some craftspeople, striving for perfection. Before problems are actively resolved, they are actively sought by attuned practitioners.

Once sought and found, resolving a problem normally involves 'exploring its scope and constraints, getting a sense of options, and developing a metric for evaluating progress toward a solution' (Kirsh, 2008: 270). In craftwork, a given problem can rarely, if ever, be correlated with a single possible solution. There are typically many ways to solve a problem or overcome a challenge, each one involving different investments of skill, resources, and time. Options might be individually appraised in relation to available means and existing constraints; the requirements and expectations of the client; and the level of experience of the maker.

By way of example, a furnituremaker confronted with the task of producing a curved component for a new chair design might contemplate the possibilities of either shaping it from a thick block of solid or laminated timber using the bandsaw, spindle moulder, lathe, or compass plane (or a combination thereof); steam-bending thin planks around the contours of a jig; or glue-laminating even-thinner strips of veneer and pressing them into shape with the use of a purpose-made jig (see Marchand, forthcoming). In adopting a way forward, the furnituremaker will take into consideration, as a minimum, the properties of the species of timber being used, the forces that will be exerted on the curved component, the desired

aesthetic of the finished chair, whether the piece is a 'one-off' or the prototype for future batch production, the availability of equipment, and his/her own confidence and technical adeptness in testing that solution. Executing the chosen solution will involve experimentation with tooling techniques, designing and constructing jigs, testing the pot life of the casein glue mixture, and conducting dry runs in assembling the chair components in order to get the processes and timing just right. Problems, challenges, and solutions will be encountered and sought at every step of the way.

In practice, craftspeople draw upon diverse resources to hand for navigating their way through obstacles. An obvious starting point is to consult standard practice and the established rules and regulations for guidance (see Diodati, this volume). These are typically found in published codes of practice, textbooks, and trade journals, and on the Internet. Joining discussions, asking questions, watching demonstrations by more (or differently) adept practitioners, or joining forces with fellow makers on a project are vital social resources for learning and discovering new ways of doing. Increasingly, these real physical interactions are being supplemented by virtual forums and blogs and by websites such as YouTube that host a growing number of short videos on 'how to'.

But, as the chapters by Erin O'Connor and Suzanne Peck, David Gates, Malcolm Martin, and Jenn Law demonstrate, makers sometimes need to suspend their assumptions and regular practice in order to move beyond an impasse. In Gates's discussion of an experimental cabinetmaking project, he discusses in detail how he consciously extended his suspension of standards in making to include reinterpretations of his tool resources. Tools have a history of use and each kind has been designed and manufactured in a way that suggests how to grasp and use it. Such physical features can be described as affordances (Gibson, 1977). But recognition of, and response to, a tool's affordances are dependent on the context as constituted by both physical surroundings and activity. For example, if a decorator needs to pry the lid off a can of paint and a flathead screwdriver is lying in wait, then chances are that she will disregard the screwdriver's history of conventional use, reinterpret its affordances, and adeptly grasp and employ it to harness the leverage she needs. Gates' long experience with handheld carpentry tools allowed him to not only use old tools in new ways, but to modify existing tools in order to approach and solve the woodworking problems that he had set for himself.

As mentioned above, dialogue taps into the existing resources of others, and the dynamic exchange of words and gestures contains the potential for incrementally generating new know-how that is shared by both parties (see Marchand, 2010 and forthcoming). Dialogue is also effective for formulating (sometimes competing) narratives about a particular problem that in turn give it shape and boundaries, and perhaps suggest a chronological sequencing of how the problem came about and what the consequences might be if it isn't corrected. Together, these qualities that are discovered in the dialogue and imposed by the narrative help to objectify a problem and thereby render it more approachable and, hopefully, more

manageable. For the maker engaged in design and making on their own, dialogue regularly occurs with the self, manifested as both internalised and externalised utterances and gestures. Like dialogue with an interlocutor, self-generated dialogue serves to code and classify perceived qualities and characteristics of the problem state, bring narrative order to those perceptions and to accompanying thoughts and emerging ideas, and allow exploration and testing of hypothetical solution paths (see Tom Martin, this volume; and Marchand, forthcoming).

As demonstrated by Erin O'Connor and Suzanne Peck's study of glassblowers and Rebecca Prentice's chapter on seamstresses (both this volume), making sketches and measured drawings, too, are kinds of dialogic practice used in collaborative or solo problem solving. The act of drawing might express a pre-formed idea, but more commonly it does the work of thinking; and, like spoken and gestural dialogue, new knowledge is incrementally built with each successive mark on the surface, each erasure, and every re-drawing. The palimpsest of lines, hatchings, shadings, and colour provide a tangible resource that can be subsequently consulted, excavated, and amended as the work evolves and new difficulties arise. Malcolm Martin (this volume) describes how keeping a work log also produces a precious resource for revisiting challenges and rethinking solutions, and for documenting technical and personal progress over time.

The physical environment of the workshop or studio space constitutes another important resource for solving problems with economy and efficiency. Ideally, the heights of work surfaces should be calibrated for comfort and good posture; spatial relations and distances between machines and workstations should facilitate flow and process; and task lighting should be optimised. Craftspeople might compile lists on notice boards, post sticky tabs, make piles (see Niamh Clifford Collard, this volume), bring order to the contents of tool cabinets or drawers, hang clocks or timers in visible locations, and arrange mnemonic markers that assist them to quickly locate tools, materials, or textbooks when needed. They might also store or display good exemplars of finished work against which they can evaluate results and solutions. As Jean Lave observed in her study of supermarkets (1988), the overall arrangement of a task environment is in itself an affordance that enables its users to orientate their activities and solve problems.

Becoming an expert craftsperson is synonymous with being aware of the resources available and knowing how to orchestrate them and competently exploit them when problems arise. Experts 'interactively probe the world to help define and frame their problems' (Kirsh, 2008: 290). They are finely attuned to constraints and affordances through regular practice in their working context (Barwise and Perry, 1983) and through regular interaction within their community of practice (Lave and Wenger, 1991). As experience accrues, the scope and nature of problems change. Elementary incidents and circumstances that pose challenges for the novice are, by comparison, deftly overcome by the experienced hand. Therefore, in order to progress learning, make a higher calibre of wares, and innovate within their field of practice, experts need to set for themselves novel challenges that drive new solutions. The majority of the chapters in this book tell that story.

## Outline of the Volume

Collectively, the chapters of this volume address a wide spectrum of disciplines, and each offers unique insights into the kinds of problems, challenges, and mistakes that makers contend with, and the diverse ways that they go about resolving and learning from them. In doing so, the authors identify forms of social organisation, cultural values, philosophies, and environmental factors that give rise to particular ways of working and problem solving in the unique contexts of their studies. Several contributors also consider the lingering (or, in some cases, newly-emerging) social stigma associated with craftwork and the ways that handiwork more generally is perceived and evaluated by makers and by the societies in which they work.

For the sake of organisation, the book is divided into two parts. The seven chapters in Part I are more resolutely focused on practical-type problems related to technique, repair, improvisation, and innovation in craftwork. While also addressing practice-based issues, the six chapters in Part II delve into challenges of a social, economic, or philosophical nature. In reality, the themes of Parts I and II cannot be neatly disentangled. After all, devising solutions to practical issues results in new knowledge; and the accumulation of knowledge often brings about change in professional status that, in turn, is accompanied by a new set of social, economic, and political challenges. Likewise, effectively managing social problems can facilitate the solving of practice-based ones. This is demonstrated perhaps most directly by Niamh Clifford Collard's study among Ghanaian weavers, which begins Part II of the volume.

In Chapter 1, authors Erin O'Connor and Suzanne Peck draw upon fieldwork and their experiences as glassblowers to examine the relationship between designer/artist and craftsperson. The roots of this relationship in contemporary glassblowing date to the mid-twentieth-century glass houses of Murano where the charge of the master glassblower shifted from the production of traditional forms to developing prototypes under the direction of a designer. Today, prototyping in glass for designers or artists is referred to as 'gaffing'. Success in that activity depends upon the glassblower's ability to interpret, understand, and realize the work that has been conceptualised by the designer/artist; and the primary means of achieving this is through creating the prototype.

By closely analysing the trial-and-error dynamic that characterises the development of the prototype, O'Connor and Peck explore the kinds of challenges encountered throughout the production process. In doing so, they demonstrate how problems are revealed, strategies are conceived, and consensus between glassblower and designer/artist is reached through dialogue, the use of visual aids, understanding of the material, and the practical processes of making. In exposing how the dynamic of problem-discovery and solution-in-practice plays out between the gaffer, their team of glassblowers, and the designer/artist, the study joins efforts to better understand knowledge as emergent from human and social engagement with the sentient and material world.

Kim Crowder's chapter furthers the effort to understand the emergent nature of knowledge by focusing on human–animal relations. Suffolk's county breed of carthorse, the Suffolk Punch, has long been associated with a proud tradition of skilled labour. Superseded by tractors during the 1950s, however, the breed is now functionally obsolete and currently listed as 'critically endangered'. Although remedial breeding programmes exist, the problems of the breed, Crowder argues, cannot be solved by such initiatives alone. Instead, the Punch needs the impetus and economic support of a reliable market for draught horses. To this end, professional horse-people and volunteers at the Hollesley Bay Colony Stud where Crowder carried out fieldwork are engaged in a project of 're-forming' the breed in order to secure its future use in forestry, driving, and small-scale farming. This enterprise involves not only the breeding, education, and training of equines, but also the transmission, reproduction, and reconstitution of traditional horsemanship and craft skills.

Taking an anthropological perspective, Crowder's chapter enquires into the problems that emerge in the learning, teaching, and practice of skilled physical labour when the medium is not an inanimate material but a sentient and intelligent large animal. Given that unbroken 'green' horses learn from accomplished handlers and, conversely, that highly skilled or expert horses contribute to the teaching of novice handlers, the chapter concerns itself with the unique working relationships and associated problematics that arise when human and horse figure interchangeably as tools and raw materials, makers and made, producers and products, and experts and novices. In exploring the overlapping human-horse processes of acquiring skills such as how to harness/be harnessed, or how to drive/be driven, the chapter vividly documents the problem-solving strategies that come into play in the formation of a relationship that horse-people consistently characterise as a 'working partnership'.

Like the preceding chapters, the third explores knowledge as emergent from interaction and problem solving in practice. Tom Martin's study describes a form of self-directed problem solving that he employed with trainees in a bicycle mechanics workshop. He maintains that this mode of teaching-learning within a controlled environment profitably enabled trainees to experience firsthand multiple mechanical processes as they transpired rather than grappling with awkward descriptions and explanations in language. The ethnography centres upon the servicing of a complex bicycle component, namely the Sturmey Archer AW-3 internally-gear hub. As the course instructor, Martin's objective was for students to learn how the mechanics of the internal components of the hub resulted in its spinning through hands-on engagement with, and analysis of, the moving parts. Learning a specific analytical method, he argues, promotes both technical know-how and craft technique.

According to Martin, processes of problem solving and the dynamics of knowing in the mechanic's workshop are one and the same. Knowing in this context means the ability to apply an analytical method that results in familiarity with component systems, their possible outputs, and barriers to their operation.



The mark of a ‘true mechanic’ is the aptitude for applying this method quickly and reliably across different component sets. While there is some ‘knowing that’ at play (e.g. about the history and nature of a flawed design that was manufactured in the past), the majority of knowing produced in the workshop is plainly of the ‘knowing how’ type.

In Chapter 4, videographer Peter Durgerian reasons that computer-based digital video editing is both an art and a craft. Like other visual and expressive arts, digital video editing involves selection of colour, visual composition, and overlaying and juxtaposing images and audio. There is also a temporal element to video editing whereby editors create rhythm, pacing, and transitions in order to ‘sculpt’ the viewers’ perceptions of the passage of time within and between scenes. Claims that digital video editing is a craft are grounded in the sense that something unique is being produced using a combination of physical action, creative thought, and techniques gained through formal training, experiential learning, and experimentation. The process involves manipulation and transformation of raw materials – albeit ones that have already been ‘crafted’ to a certain degree by other processes and stages in the filmmaking process – into a finished product.

Drawing on more than 30 years’ experience as a videographer, Durgerian’s chapter explores an array of problems encountered in the process of choosing and ordering images and sounds into unique sequences – a process that he claims can be both purposeful and playful, but also vexing and fraught with difficulties. The quality of the raw footage and audio recording that an editor is given to work with can present a variety of problems, but so too can his/her own oversights, mistakes, and misunderstandings that occur during post-production. Such blunders often arise through miscommunication or lack of coordination with other individuals involved in the film project, as he shows. With reference to specific case studies, Durgerian examines how certain solutions that he devised – either purposely or accidentally – for one-off or recurring problems sometimes evolved to become integral to his normal working practice. He also explores how, subsequently, such solutions-turned-standard-practice can be experimentally subverted to create new techniques.

As both a printmaker and an anthropologist, Jenn Law examines the concept of ‘mastery’ in relation to contemporary printmaking practices, focusing on the ways that knowledge is collectively and dynamically produced and embodied through material processes. To be skilled at printmaking requires meticulous preparation and organisation, a thorough understanding of the equipment and materials, and an embodied knowledge of technical process that can only be mastered over time through practical experience. Printmaking also offers important lessons about time and timing, momentum and rhythm, and the value of building layers and working with repeatable modules or components. By its very nature, printmaking lends itself to experimentation with new methods, materials and technologies, involving the marriage of traditional methods with new media.

Law notes that the relevance of print-based work in the contemporary art world has grown over the past decade due to renewed interest in handcrafted artisanal

work. Yet despite this shift toward skilled production, the role and education of the master printmaker has dramatically changed, with a marked decline in apprentice-style training programmes. As new ways of learning and making take hold, Law proposes that an expanded notion of mastery is warranted – one that is decidedly more promiscuous, defined by the abilities to navigate across disciplines and to transfer the lessons acquired from one process into the learning of another. Print-based practice, she argues, should be interpreted as a set of unique aesthetic, conceptual, and technical problem-solving strategies that can be transferred and applied across diverse media. In considering the ways that artists employ print-based strategies across media, the chapter reflects on print's chameleon-like ability to simultaneously mimic and inform the characteristics of other disciplines, while remaining faithful to a distinctly graphic outcome.

The experimental dimension of problem solving explored by Durgerian and Law is developed by David Gates in Chapter 6. As a designer-maker of furniture in wood, Gates observes that a range of standard strategies for minimising risk have evolved during the history of his craft, each deploying an array of bespoke tools and apparatuses. The practices of sketching, modelling, producing measured drawings, and making prototypes has allowed furnituremakers to encounter problems and test solutions at a safe distance from the final piece. This classic method, however, is necessarily time consuming and 'feedback loops' of learning and development can be slow. In this chapter, Gates describes a studio research project purposely aimed at disrupting his habitual modes of working. The disruptions opened spaces for him to interrogate his skilled practices and to identify the very assumptions upon which they had been founded.

'What can I learn about the ways I make furniture by making it in a different way?' was the driving question for Gates' experiment. He substantively altered his working environment by introducing strict limitations on four key components in his regular work: namely, time restrictions for making each piece; drastically reducing the number of tools; using timber offcuts only; and prohibiting the use of drawing and formal measuring devices. This made improvisation necessary for navigating the problems, challenges, and limitations that he encountered while making. By documenting his processes, Gates was able to compare his improvised strategies with his orthodox methods of working. He reports that the resulting pieces were of an intermediate or hybrid nature. Evidence of his experimental strategies and processes lay closer to their surfaces, thereby making a reading of his problem-solving efforts more legible.

In the final chapter of Part I, Stephanie Bunn draws on her collaborative research that explores the social and ethno-history of Scottish vernacular basketry. Bunn alleges that basketry was a genuine 'fabric of society', providing a weave of connections between communities and between domestic and working activities, including fishing, farming, crofting, home-building, and industry. In Scotland, the nearly-complete replacement of basketry by industrially-produced alternatives for carrying things is recent.

Bunn's study illustrates how problem solving is ongoing in basketwork, and not merely a response to exceptional events. Problem solving is an activity integral to the rhythm, the weave, the aesthetic, and the tension of basketwork. Most fundamentally, the basket-maker is creating a three-dimensional structure while simultaneously building this structure into the frame with which they are weaving. The basket thus acts as both final form and the tool to achieve that form, a factor cited to explain why there are no basket-making machines. Furthermore, due to natural variations in shapes and sizes of the plant materials employed in basketwork, the maker is continuously adjusting the tension and selecting materials to change the shape fractionally if one of the stakes is uneven and threatens to alter the final form. In the case of Scottish vernacular basketry, makers in some regions and isles also had to respond to challenges posed by the scarcity of raw materials; new developments in the fisheries, hospital care, war technology, and industrial demands; and by the need to make a living by mending baskets.

In the final section of her chapter, Bunn discusses basketry solutions that arose without problems, often in the face of great hardship, and pointing to necessities not articulated. Such inexplicable solutions included regional variations when there were no ostensible differences in local circumstance; lone, committed makers seeking new and improved developments in design; and, like Sennett's idealised craftsman, unknown makers who simply worked to produce the best they could.

Part II begins with a chapter by Niamh Clifford Collard whose anthropological fieldwork centred upon weavers in the rural Ghanaian town of Kpetoe. These men live and work in a context that the author characterises as economically precarious. Accordingly, her chapter examines the degree to which craftspeople's tactics and strategies for managing work and for problem solving are socially embedded. The ethnography highlights the ways that skilful mastery of weaving techniques and materials is coupled with the careful cultivation of friendships, customer relations, and relationships with wives, children, and elders. These social networks, Clifford Collard argues, are essential for making a living from weaving work in an uncertain and changeable market economy. Whilst the ability to produce cloth to a high standard is fundamental, the technical skills required to do so are taken for granted among weavers. Rather, the more challenging skill to master is the ability to grapple flexibly with the many problems and challenges that arise within the social relations that make economic survival possible.

The weavers' embeddedness in social, moral, and generational matrices allowed them to make use of connections to overcome challenging situations. However, conflicts often arose between the Kpetoe weavers, and between weavers and individuals within their support networks, over struggles for limited resources, generational differences, suspicion, mistrust, perceptions of iniquity, and greed. Clifford Collard's ethnographic material illustrates that problem solving among weavers regularly operated within defined limits: sociality, it was discovered, could be a stricture as much as it was an enabler. The chapter argues that any account of problem solving that focuses exclusively on the technical dimensions in the weavers' craft would disguise this, and thereby occlude an understanding

that craftspeople operate within the social worlds available to them and manage as best they can with what is possible.

Like Clifford Collard, Rebecca Prentice focuses on the social dimensions of craftwork and problem solving in her chapter on garment workers in Trinidad. The Trinidadian garment sector was nearly decimated in the 1990s after an IMF-backed programme of liberalisation opened national trade barriers to ready-made clothing from abroad. What survives is a small, diverse, and tenacious local industry made up of small and medium-sized factories, illegal sweatshops, seamstresses' and tailors' workshops, and hundreds of women who stitch clothing from their homes. Notably, many women work both as factory wage labourers and for private clients after working hours. Despite widespread belief that industrial factories are sites of deskilling, Trinidadian garment workers who sew on commission use the factory as a learning environment for acquiring technique as well as new design ideas.

Grounded in ethnographic research, Prentice argues that technical challenges cannot be separated from the embodied, social, and political-economic factors of the trade. With reference to social theories of affect, she explores the relevance of 'feeling' as a mode of diagnosis, problem solving, and action with which garment workers negotiate the various 'dressmaking dilemmas' they encounter in the factory and at home. By studying intimate experiences of the body, work, and sociality, the author links the garment makers to an exterior world and, importantly, illuminates the extent to which the women's sense of what is possible is shaped by dominant structures, but without representing those structural conditions as totalising systems. Prentice's emphasis on affect shows that the success and survival of the seamstresses is contingent upon 'feeling a way through' both material and social relations.

In Chapter 10, Geoffrey Gowlland, like other contributing authors, refutes the notion that solving problems in craft occurs uniquely at the moment of design. With reference to his fieldwork with Taiwanese ceramicists, he examines the dichotomies that this assumption introduces between the work of the designer and that of the artisan, and therefore between the work of the mind and that of the hands. The chapter also challenges a commonly-held view that problem solving entails a linear process of stepping back from the work, reflecting on the issues, formulating possible solutions, and applying them through handwork. His research clearly demonstrates that processes of problem solving need not be distinguished, or separated, from the act of making.

Gowlland illustrates how different kinds of craftwork demand different kinds of training and different methods of engagement, response, and problem-solving tactics. In the ceramics industry of Yingge, the various stages in making a pot are undertaken by distinct artisans. The chapter concentrates on one artisan at the wheel and another engaged in glazing the wares. The case studies show that the differences in the kinds of demands and ways of working associated with these two activities influence the relationship between the respective artisans and generate local discourses and judgements of value about work ethics and craft identities. In Yingge, the glazer's processes of problem solving are classified as

mental work, supposedly relying on knowledge acquired through formal education or intellectual research. The clay artisan, by contrast, is understood to be involved in a more direct kind of problem solving that responds to the moment-by-moment changes in the clay. In local discourse, this kind of craftwork exemplifies ‘work of the heart’.

In the next chapter, Malcolm Martin asks, ‘What enables or inhibits makers in finding creative solutions to the challenges they encounter in craftwork?’ Changing identity and sense of self, he determines, are fluidly manifested through workshop practice and problem solving. His highly-personal exploration takes its inspiration from an essay by the Japanese critic Sōetsu Yanagi that was written in 1954 and later published in English as ‘The Buddhist Idea of Beauty’. Yanagi was a well-known advocate of what he coined ‘*mingei*’, meaning the crafts of the people. His admiration for Mingei was based not on stylistic or cultural grounds, but on the directness and creative freedom expressed by these crafts. Meditation and other practices in Zen Buddhism clear the way for spontaneous and appropriate action in any situation, including confrontation with challenges and problems. Yanagi examined the ways in which the makers of Mingei objects were able to shed preconceptions and habits in order to achieve truly creative responses to restrictions imposed by materials, technology, and individual ability.

As a professional craftsman, Malcolm Martin set out to learn from the approach of the Mingei makers. In the summer of 2013, he and his creative partner, Gaynor Dowling, spent two months in residence at The Center for Art in Wood in Philadelphia. The experience afforded them the opportunity to critically examine and challenge their practices at every level. The results, reports Martin, were entirely unexpected and the couple produced work previously unimagined. Importantly, the experience also made plain that their identities as makers are in a state of continuous formation, and that one’s sense of self could be beneficially ‘softened’ if one embraces new contexts and conditions and frees oneself to explore material, technological, and personal challenges in responsive, unpremeditated ways.

Giovanni Diodati is a conservation architect and educator with long experience. With the use of case studies, Diodati’s chapter examines the roles of craftspeople in collaborative problem-solving processes for conserving Canadian architectural heritage, ranging from modest vernacular structures to the neo-gothic edifices of the Canadian Parliament. The chapter outlines major paradigm shifts in construction practice that took place between the late nineteenth century and the present, resulting in the mantra ‘create, maintain, restore’ being supplanted by ‘fabricate, consume, discard’. As a consequence, the tradition of the autonomous craftsman largely disappeared, replaced by contracting and sub-contracting companies. Diodati notes that the ongoing trend toward individual specialisations has given rise to pressing questions: Who determines the scope of work? Who is ultimately responsible for the result? And, how are concepts such as ‘trade standard’ and ‘rules of the trade’ defined? Where the craftsman once possessed the knowledge and experience to fully exercise his trade, no individual

actor in the new contracting structure has the necessary resources or authority to practice in that way. The chain of decision making is long, and the financial costs of construction and restoration are prohibitively high.

Diodati concedes that it would be naïve to think that reviving the ‘traditional craftsman’ would solve our current challenges in heritage conservation. He nevertheless acknowledges that craftspeople’s contributions throughout the conservation process are essential for overcoming the fragmentation of roles and responsibility, and for making a project a success. A well-trained and seasoned craftsperson is both builder and problem solver, equipped with intimate knowledge of his/her materials, methods, and tools of the trade. Recognition of this among contemporary conservationists, contends Diodati, will promote greater inclusion of craftspeople within multidisciplinary teams. As a result, teams will be better equipped to interpret the past, assess cultural value, diagnose the pathologies, and develop solutions. Projects can also be better planned with informed understanding that the majority of work will be carried out by semi-skilled workers while only the most critical tasks will be executed by trained craftspeople.

In the final chapter, Rachel Philpott and Faith Kane demonstrate how ‘textile thinking’ can be used as an effective strategy for generating novel concepts, problem solving, and creatively overcoming challenges in interdisciplinary, collaborative practice. They suggest that the unique intelligence of ‘textile thinking’ and the material culture it informs is often overlooked due to the tacit nature of the knowledge involved, believed to be ‘stored’ in the hands of a practitioner or embodied in the resulting textile artefacts. But, a textile maker’s sensitivity and ability to balance the constantly changing tension between interconnected fibres is essential for the successful production of textile artefacts and, the authors argue, cultivates a particular approach to conceptualisation. Such thinking has the potential to originate new materials and material systems in addition to enhancing both functionality and perceptions of existing ones.

Philpott and Kane’s chapter is based on the results of their interdisciplinary and international networking project, Textile Thinking for Sustainable Materials (TTSM). The project investigated the generative and problem-solving potential of a mode of thinking that prioritises continuous, connected approaches where relationships between elements are more important than any individual part. A two-day TTSM event brought together textile designers, product designers, materials scientists, chemists, and engineers to establish creative dialogues that explore the development of new sustainable materials for design-led functions, alternative use of materials technologies towards design, and new applications of existing sustainable materials within design contexts. The event delved into the ways in which ‘textile thinking’ and textile crafting activities might act as catalysts to connect the distinct knowledge bases of seemingly unrelated disciplines and ultimately inform the development of advanced scientific and technological procedures and products both within textiles and in other disciplines, with particular relevance to sustainable agendas.



In sum, the focus of this collection makes a unique contribution to research on craft. To the best of my knowledge, no other book is dedicated to exploring situated cognition and the dynamics of problem solving in skilled handwork and making. Problem solving, it is demonstrated, plays a seminal role in learning and personal development, and in eventually achieving a master's status in one's trade. As the volume editor, I am optimistic that the contents will spearhead a vibrant and interdisciplinary subfield of ethnographically-grounded research in human skill and creativity. It is also deeply hoped that the chapters will generate greater dialogue between social researchers, professional makers, and educationalists that, in turn, will transform the widespread undervaluation of manual work into recognition and appreciation for the creative intelligence and ingenuity involved in craft.

### Acknowledgements

I express my gratitude to the British Academy for supporting my field-based study of the connection between brain, hand, and tool which centrally included investigations into problem solving at the carpenter's workbench. The research was carried out at the Building Crafts College in East London in 2012–13. Special thanks to fine-woodwork instructor Cheryl Matthey and the cohort of first-year trainees for their kind cooperation. Thanks to John Heywood for his editorial comments on an earlier draft of this introduction.

### Bibliography

- Adamson, G. 2007. *Thinking Through Craft*. Oxford: Berg.
- Bachmann, I. 2002. 'New Craft Paradigms', in J. Johnson (ed.) *Exploring Contemporary Craft: history, theory and critical writing*. Toronto: Coach House Books with the Craft Studio at Harbourfront Centre, pp. 45–50.
- Barwise, J. and J. Perry 1983. *Situations and Attitudes*. Cambridge, MA: MIT Press.
- Dilley, R. 2009. 'Specialist Knowledge Practice of Craftsmen and Clerics in Senegal', in *Africa: Journal of the International African Institute*, 79(1):53–70.
- Fardon, R. 1990. 'African Ethnogenesis: Limits to the Comparability of Ethnic Phenomena', in L. Holy (ed.) *Comparative Anthropology*. London: Blackwell.
- Gerdes, P. 2010. *Othava: Making Baskets and Doing Geometry in the Makhuwa Culture in the Northeast of Mozambique*. Lulu.com publishers.
- Gibson, J.J. 1977. 'The Theory of Affordances', in R.E. Shaw and J. Bransford (eds) *Perceiving, Acting, and Knowing*. Hillsdale, NJ: Lawrence Erlbaum, pp. 67–82.
- Greenhalgh, P. 2002. 'Introduction: craft in a changing world', in P. Greenhalgh (ed.) *The Persistence of Craft: the applied arts today*. London: A & C Black, pp. 1–17.

- Greeno, J. and Middle School Mathematics through Applications Project Group, 1998. 'The Situativity of Knowing, Learning, and Research', in *American Psychologist*, 53(1):5–26.
- Harrod, T. 1999. *The Crafts in Britain in the 20th Century*. New Haven, Connecticut: Yale University Press.
- Herzfeld, M. 2004. *The Body Impolitic: artisans and artifice in the global hierarchy of value*. Chicago: University of Chicago Press.
- Jackson, L. 2004. 'Craft Wars', in *Icon Magazine*, 016, October 2004 <http://www.iconeye.com/404/item/2691-craft-wars-%7C-icon-016-%7C-october-2004>.
- Kirsh, D. 2008. 'Problem Solving and Situated Cognition', in P. Robbins and M. Aydede (eds) *The Cambridge Handbook of Situated Cognition*. Cambridge: Cambridge University Press, pp. 264–306.
- Lave, J. 1988. *Cognition in Practice: mind, mathematics and culture in everyday life*. Cambridge: Cambridge University Press.
- Lave, J. and E. Wenger 1991. *Situated Learning: legitimate peripheral participation*. Cambridge: Cambridge University Press.
- Marchand, T.H.J. 2009. *The Masons of Djenné*. Bloomington, Indiana: Indiana University Press.
- 2010. 'Embodied Cognition and Communication: studies with British fine woodworkers', in *Journal of the Royal Anthropological Institute*, 16(s1): 100–120.
- 2012. 'Knowledge in Hand: explorations of brain, hand and tool', in R. Fardon, O. Harris, T. Marchand, M. Nuttall, C. Shore, V. Strang and C. Wilson (eds), *Handbook of Social Anthropology*. London: Sage, pp. 260–69.
- 2014a. 'For the Love of Masonry: Djenné craftsmen in turbulent times', in *Journal of African Cultural Studies*, 26(2):155–72.
- 2014b. 'Skill and Aging: perspectives from three generations of English woodworkers', in E. Hallam and T. Ingold (eds) *Making and Growing: anthropological studies of organisms and artefacts*. Farnham, Surrey: Ashgate, pp. 183–202.
- 2015. 'Managing Pleasurable Pursuits: utopic horizons and the arts of ignoring and "not knowing" among fine woodworkers', in R. Dilley and T. Kirsch (eds) *Regimes of Ignorance: anthropological perspectives on the production and reproduction of non-knowledge*. Oxford: Berghahn.
- forthcoming. 'Problem Solving at the Workbench', in T. Marchand *The Pursuit of Pleasurable Work*.
- M'Closky, K. 1996. 'Art or Craft: the paradox of the Pangnirtung weave shop', in C. Miller and P. Chuchryk (eds) *Women of the First Nations: power, wisdom, and strength*. Winnipeg: University of Manitoba Press, pp. 113–26.
- McNaughton, P. 1993. *The Mande Blacksmiths: knowledge, power and art in West Africa*. Bloomington, Indiana: Indiana University Press.
- Metcalfe, B. 2002. 'Contemporary Craft: a brief overview', in J. Johnson (ed.) *Exploring Contemporary Craft: history, theory and critical writing*. Toronto: Coach House Books with the Craft Studio at Harbourfront Centre, pp. 13–23.

- Morris, W. 1996 [1888]. 'The Revival of Handicraft', in C. Poulson (ed.) *William Morris on Art and Design*. Sheffield: Sheffield Academic Press.
- 2004 [1890]. 'News from Nowhere', in W. Morris (author) *News from Nowhere and Other Writings*. London: Penguin, pp. 41–228.
- Needham, R. 1975. 'Polythetic Classification: Convergence and Consequences', in *Man*, New Series, Journal of the Royal Anthropological Institute, 10(3):349–69.
- Newell, A. and H. Simon 1972. *Human Problem Solving*. Englewood Cliffs, NJ: Prentice Hall.
- Pye, D. 1995 (1968). *The Nature and Art of Workmanship*. London: The Herbert Press.
- Risatti, H. 2007. *A Theory of Craft: function and aesthetic expression*. Chapel Hill: The University of North Carolina Press.
- Sennett, R. 2008. *The Craftsman*. London: Allen Lane.
- Smith, P. 2006. *The Body of the Artisan: art and experience in the scientific revolution*. Chicago: University of Chicago Press.
- Sohn-Rethell, A. 1978. *Intellectual and Manual Labour: critique of epistemology*. London: Macmillan.
- Suchman, L. and R. Trigg 1993. 'Artificial Intelligence as Craftwork', in S. Chaiklin and J. Lave (eds) *Understanding practice: perspectives on activity and context*. Cambridge: Cambridge University Press, pp. 144–78.
- Vygotsky, L.S. 1978. 'Interaction Between Learning and Development', in L.S. Vygotsky *Mind and Society: the development of higher psychological processes*. Cambridge, MA: Harvard University Press, pp. 79–91.
- Wilson, R. 1993. 'Anchored Communities: Identity and History of the Maya-Q'eqchi'', in *Man*, New Series, Journal of the Royal Anthropological Institute, 28(1):121–38.

